Microwave Curable Adhesive

Docket: UAH-P-11003

Technology

Heat-curing adhesives, by definition, cure rapidly when heated, and usually require an oven to accelerate the cure. However, large structures assembled using heat-curing adhesives require large ovens and longer heating times to raise the temperature of the whole structure until the heat reaches the adhesive somewhere in the center - not very cost effective. The whole structure is heated in an oven merely to cure a small volume of adhesive. Regardless of structure size, there is a risk that the structure will melt or become deformed during the heat-curing process.

Researchers at UAHuntsville have invented an Ionic Liquid Epoxy (ILE) which can be cured with microwaves. The ILE absorbs microwaves very well and heats up very quickly and precisely using microwaves. The powerful advantage is selectively heating the bond line without heating the whole structure surrounding it. The bonding region cannot be surrounded by metal since it blocks microwaves. One could bond a dielectric material (e.g. plastics, foam, ceramics and wood) to metal by directing the microwaves through the dielectric and reflecting off the metal.

One could easily bond dissimilar materials like ceramic on metal. Complex parts can be jigged together with uncured epoxy taking as much time as required and then cure all the bonds throughout the structure at one time like cementing all parts on a model ship in a bottle.

Applications

- Industrial adhesive
- Every-day consumer adhesive

Advantages

- Cost-effective because it does not require large ovens or significant power for large structures
- Bond difficult materials to each other
- Bond two partially assembled structures in a hidden area
- Repair structures that break in difficult to reach places
- No concerns with pot life of mixed adhesives

Status

State of Development: Prototype
Licensing Status: Available for licensing
Patent Status: Pending